REMARKS

Claims 2 and 4-5 are pending in this application, all of which have been amended. Claims 1 and 6 have been canceled. No new claims have been added.

Claims 1-2 and 4-6 stand rejected under 35 USC §112, second paragraph, as indefinite.

Accordingly, claims 2 and 4-5 have been amended to correct the noted instances of indefiniteness, while claims 1 and 6 have been canceled for the reasons discussed below. Thus, the 35 USC §112, second paragraph, rejection should be withdrawn.

Before turning to the cited references, a brief review of the present invention is in order.

The present invention relates to a control apparatus of a parallel-type hybrid vehicle, including an engine E and a single motor M as the drive sources, and a battery, wherein the motor assists the engine output at the time of acceleration of the vehicle. The fuel supply to the engine is stopped by the fuel supply stop device at the time of deceleration and regenerative braking is performed by the motor by the motor depending upon the deceleration state.

Some features of the present invention are as described below:

(a) The engine of the present invention is constituted as a type of engine capable of switching between a normal driving operation and a cylinder deactivation operation for at least one cylinder by a variable valve timing mechanism mounted for each cylinder. Accordingly, when the vehicle is decelerating, the engine can enter into the cylinder deactivation operation while the motor is in the regeneration operation.

(b) The control apparatus comprises a cylinder deactivated operation determining and executing devices. When it is determined by the cylinder deactivation operation determining device that it is appropriate to perform the cylinder deactivation operation, the control apparatus first stops fuel supply to the engine and then performs the cylinder deactivated operation by closing both intake valve and exhaust valve of each cylinder by the variable timing mechanism.

(c) In the cylinder deactivation operation, the fuel supply to the cylinder is first stopped, and both intake and exhaust valves are closed. Therefore, the cylinder deactivated operation serves to reduce pumping losses and friction of cylinders. The energy loss resulting from pumping can be recovered and inflow of fresh air into the cylinder while the cylinder deactivation operation is carried out.

(d) When the vehicle is decelerating, the regeneration energy recovered by regenerative braking is obtained. Furthermore, the recovered energy by the cylinder deactivation operation is added to the regeneration energy and the total recovered energy is used for charging the battery, which results in increasing the opportunity for the motor to assist the engine output and increasing the energy consumption efficiency of the parallel-type hybrid vehicle.

(e) When it is determined that the cylinder deactivation operation is released and to switch to the normal driving operation, the intake and exhaust valves are first opened, and the fuel supply is gradually restarted. That is, the amount of fuel to be supplied to the engine is gradually increased after the intake and exhaust valves are reopened by the action of the variable valve timing mechanism.

Claims 1 and 5 stand rejected under 35 USC §103(a) as unpatentable over **Masberg et al.** (cited in a previous Office Action) and claims 2, 4 and 6 stand rejected under 35 USC §103(a) as unpatentable over **Masberg et al.** in view of **Sturman** (previously applied).

Applicants respectfully traverse both of these rejections.

As noted in Applicants' response dated February 24, 2004, **Masberg et al.** discloses both the regeneration of power by the motor and the cylinder shut off operation. However, the feature of the present invention that deactivation operation is carried out when the fuel supply is stopped while the vehicle is decelerating is not disclosed. That is, **Masberg et al.** neither discloses nor suggests that when the vehicle is decelerating, regenerative braking power generation is carried out even though the fuel supply is stopped and the cylinder deactivation is also carried out, as in the present invention.

Furthermore, **Masberg et al.** neither discloses nor suggests the feature of the present invention that at the time of switching the engine from the cylinder deactivation operation to the normal driving operation, the amount of fuel to be supplied to the engine is gradually increased after

the intake valves and exhaust valves are reopened by the action of the variable valve timing mechanism.

Therefore, **Masberg et al.** fails to teach, mention or suggest the limitations of claim 2, as amended, of the instant application, which recites that the cylinder deactivation operation is carried out at the same time as the regeneration operation by stopping the fuel supply first and by closing both intake and exhaust valves of each cylinder by the variable valve timing mechanism and the cylinder deactivation operation is released to the normal driving operation by opening both intake and exhaust valves of the cylinders first, and by gradually increasing the amount of fuel supply.

Sturman has been cited for teaching a valve position sensor.

Neither of the cited references teaches the following features of the present invention:

① That when the fuel supply is restored by releasing the fuel supply stop to the engine by said fuel stop device, the fuel supply is gradually increased by a predetermined amount depending on the throttle opening. Even if, as the Examiner suggests, it would be obvious to gradually increase the amount of fuel to the cylinders when the shut-off cylinder are restarted, there is no suggestion in either reference that the amount of such increase would be dependent on throttle position, as recited in claim 4 and as disclosed on page 32, lines 1-6 of the specification.

② That a variable timing mechanism is utilized to change timing to open both intake valves and exhaust valves of the cylinders first, and the fuel supply is then restarted in order to absorb shock when resuming fuel supply and switching from the cylinder deactivated operation to the normal operation, as recited in claim 6 of the instant application. The Examiner's comments about the obviousness of the relative timing of these actions relates to the switching from normal operation to the cylinder deactivated operation, and not vice-versa, as discussed above. Backfiring is not a factor in determining that fuel supply is restarted after intake and exhaust valves are opened because, regardless of the order, there are no unburned gases in the exhaust part to cause such a backfire in this mode. As recited in claim 6 of the instant application, the reasons for the recited order is to absorb shock, which is not discussed in either of the cited references.

Accordingly, claims 1 and 6 have been canceled and the limitations of claim 6 have been added to claim 2. Claim 5 has been amended to depend from claim 2, as amended.

Thus, the 35 USC §103(a) rejection should be withdrawn.

In view of the aforementioned amendments and accompanying remarks, claims 2 and 4-5, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition(s) for an appropriate extension of time. The fees for such an extension or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 01-2340.

Respectfully submitted,

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